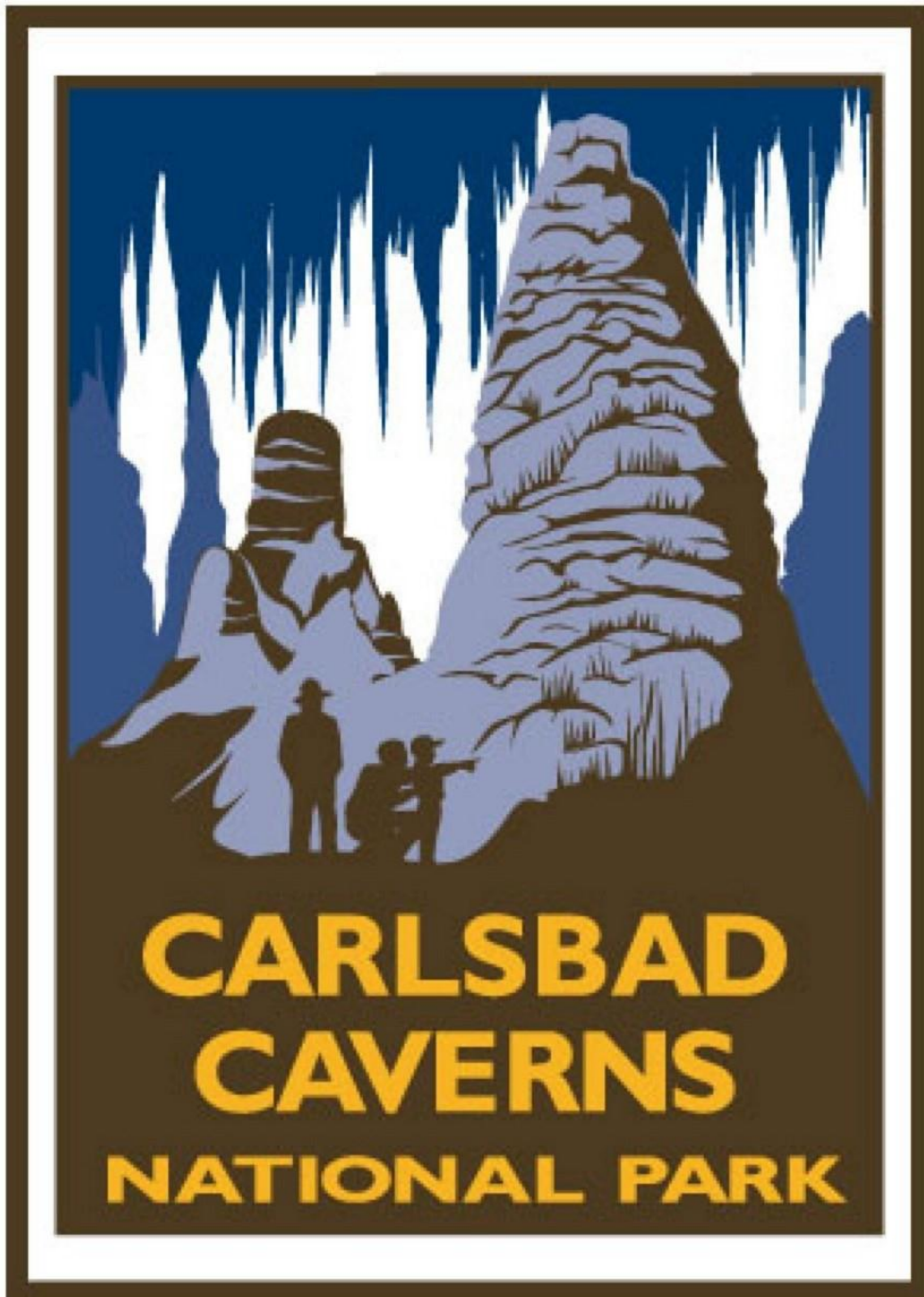


Life Science

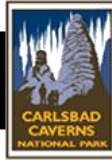
A curriculum and activity guide for Carlsbad Caverns National Park



Middle School Ecology



Conservation	85
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2. Are You Ready? An activity designed to help students learn to prepare for backcountry travel.....	101
3. Where Do We Camp? An activity designed to help students learn about campsite selection.	111



Conservation

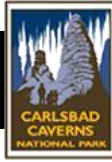
"We must understand that the human and non-human problems are linked. If the forest goes the wildlife goes, and eventually, the ever-increasing human population, no longer able to live in harmony with the natural world, will face starvation."

Yes, there is hope. Especially if we can give hope to children, harness their energy, their concern. We must teach them how to care for the world around them so that societies once again can live in harmony with nature."

Dr. Jane Goodall

People often use the words conservation and preservation synonymously. However there is a difference. Conservation is the sustainable use and management of natural resources including wildlife, water, air, and earth deposits. Natural resources may be renewable or non-renewable. Conservation of natural resources usually focuses on the needs and interests of human beings, for example the biological, economic, cultural, and recreational values such resources have. Conservationists accept that development is necessary for a better future, but only when the changes take place in ways that are not wasteful. Preservation, on the other hand, attempts to maintain the present condition of areas that are so far untouched by humans. This is due to the concern that mankind is encroaching onto the environment at such a rate that many untamed landscapes are being given over to farming, industry, housing, tourism, and other human developments, and that we are losing too much of what is "natural." No matter what your beliefs are on the area of preservation, you cannot deny the fact that humans have a tremendous impact on our natural environment. Many of us enjoy outdoor activities that are consequently harmful to the environment if we are not careful and aware of our surroundings.

This unit will focus on ways people can enjoy the wilderness in an environmentally friendly way. In the first activity, *We're All Connected*, students will see the interrelationships of plants and animals in an ecosystem. In the second activity, *Are You Ready?*, the students will learn how to prepare for backcountry travel. In the final activity, *Where Do We Camp?*, students will learn how to select an appropriate campsite in a desert environment.



We're All Connected

A personal connection with the natural world nurtures a commitment to protect it.

Summary: Students will participate in a game designed to help them gain an understanding of how the natural world functions and our ability to change this world. Students are reminded that humans are a part of the natural world and thus should be committed to protecting it.

Duration: 1 class period

Setting: Classroom

Vocabulary: ecosystem, stewardship, pollinate, aquifer, ecotone, edge

Standards/Benchmarks Addressed: SC1-E1, SC1-E2, SC2-E1, SC3-E1, SC4-E1, SC4-E2, SC4-E5, SC5-E2, SC6-E1, SC6-E2, SC6-E3, SC6-E6, SC9-E2, SC11-E1, SC11-E2, SC11-E3, SC11-E4, SC11-E5, SC11-E6, SC11-E10, SC15-E2, SC16-E1, SC16-E2

Objectives

Students will:

- describe connections between the plants and animals of an ecosystem.
- describe behaviors that will help ensure the protection of our natural resources.
- gain a better understanding of their own environment.

Background

Ecology is the study of interactions between living things and their environments. Ecology comes from the Greek word *oikos*, which means home. The word ecosystem refers to the system of interactions between living and non-living things. Over the past 30 or 40 years, ecosystem has been defined in a variety of ways. Sometimes it is described in terms of the interactions and sometimes in terms of the area where the interactions occur. The use of the term here means a system that has a source of energy (the sun) and includes living and nonliving components. The living components include plants and animals, including human beings. The nonliving components include soil, rocks, water, air, and other physical features.

An ecotone is a zone where two ecosystems overlap. An edge is an area where two or more communities meet abruptly. In local communities there are many edges. This may result from an abrupt change in soil type or other natural causes, or as a result of human activities or fire. Edges attract humans. Because of this, it is in the edge that we see the greatest human impact.

The most accessible edge in your community may be the edge of the school ground. Other edges can be stream banks, lake shores, marsh edges, forest meadows, and ocean beaches. In such places there is the possibility that humans will change the ecotone with damaging consequences for wildlife and plants. Changes may include such things as marshes being drained or filled for construction or agriculture. Natural forests are often cut down for homes and lawns. Streams can be dammed and rivers channelized for boating or shipping. Human litter and other refuse on a lakeshore are also changes. These changes are often an indicator of other human-created problems. Fish-kills and prolonged absence of waterfowl are often indicators of contaminated water.

Plants, insects, animals, and humans owe their existence to one another. Insects pollinate plants and provide food for small animals; plants provide food and shelter for both animals and humans. Plants also help filter water that is then stored in mountains, streams, lakes, and

aquifers. When one member of the web of life has been altered or eliminated, other living things are invariably affected.

People are an integral part of the Earth's ecosystem and the health of ecosystems is intertwined with the viability of human communities. Like all living beings, people require the use of resources. From the air we breathe to our food, water, shelter, clothing, arts, and communication networks, we consume resources to live. Just try to imagine something in your home that is not grown or mined. We tend to forget the fact that natural resources usually support a country's economy. Our goal in managing the ecosystem should be the wise and reasonably paced use of our resources to assure their availability far into the future. Individuals can take actions to make a difference.

Materials

Plant and animal cards

Double-sided tape

Ball of yarn

Scenario cards

Procedure

Students need to adopt reasons for caring for our natural world. By helping students understand the impact of "just one little piece of litter" we assist them in developing stewardship in caring for the environment.

Warm up: Teachers will write the following items on the board and ask students to guess the life expectancy (time it takes to degrade) of each item.

- Paper (2-4 weeks)
- Banana peel (3-5 weeks)
- Plastic six-pack holder (3-8 weeks)
- Wool cap (1 year)
- Cigarette butt (2-5 years)
- Disposable diaper (10-20 years)
- Hard plastic container (20-30 years)
- Rubber boot sole (50-80 years)
- Tin can (80-100 years)
- Aluminum can (200-400 years)
- Glass bottles (thousands or millions of years)

Get feedback from the students regarding the time it takes for each of these items to degrade. Discuss the impact this makes in our ecosystem and in our dumps!

Activity: Students will play a game that demonstrates the connection between plants and animals in an ecosystem.

Students will be given a plant or animal card to stick to their shirts. Students will form a circle. In the middle of the circle (on the floor) lay the following cards: sun, water, soil, and air. The leader can start the ball of yarn. They must look around the circle and find another plant or animal that they need, or that needs them, in order to survive. The person holding the yarn describes this connection and then throws the yarn to that person representing the plant or animal. (ex. "I need the downed log for a home." "The owl needs me for food.") Play goes around the circle until everyone is holding a section of the yarn. No one should let go of the yarn. In some cases people may have received the yarn more than once. Have group members observe the web of

connections they have made. Discuss what the web demonstrated about connections in an ecosystem (don't forget the human connection).

Have each student think about one item from the middle of the circle (sun, water, soil, and air) and describe one connection he or she has to this resource (ex. "I need sun in order to photosynthesize").

Next, have a student read a scenario card. The group should discuss the question. The person who reads should drop their string to show how an impact of one part of the web affects another part (ex. If a camper plays in a small desert water hole, it becomes polluted for the animals that drink there). Anyone with a card that would be affected should also drop their string.

Wrap Up: Have students summarize what they have learned from the game. Students should brainstorm positive methods of ecosystem management and how they support the natural resources.

Assessment

Students will create a poster that demonstrates an ecosystem management concept. They will present this to the class.

We're All Connected

SUN

WATER

AIR

SOIL



Gamble's Quail



American Kestrel



Harris' Hawk



Burrowing Owl



Golden Eagle



Turkey Vulture



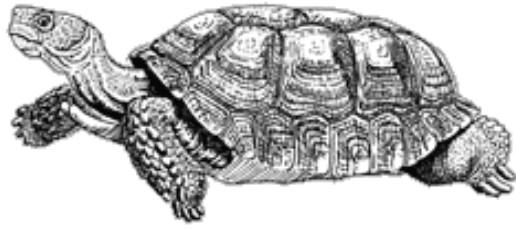
Cactus Wren



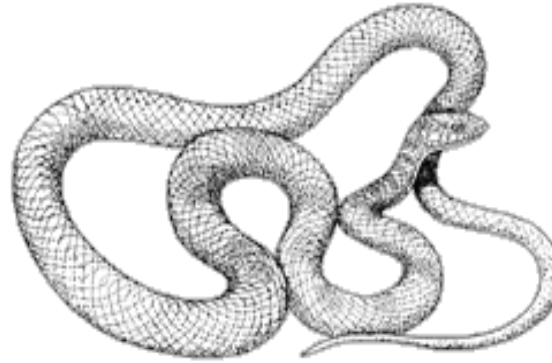
Common Raven



Greater Roadrunner



Desert Tortoise



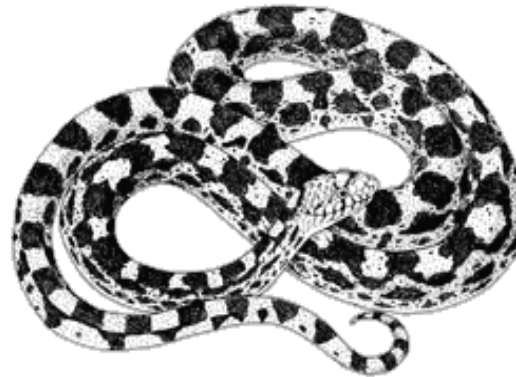
Western Coachwhip



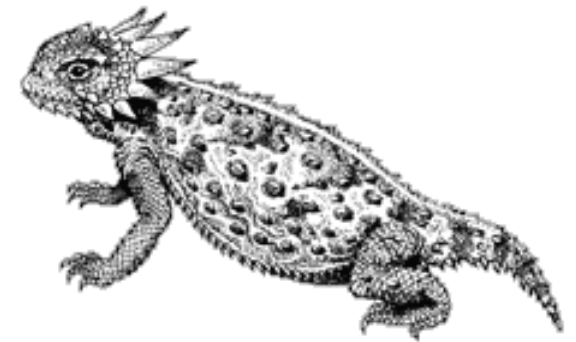
Western Diamondback



Gila Monster



Gopher Snake



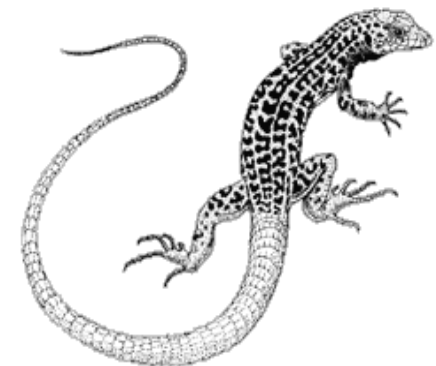
Horned Lizard



Collared Lizard



Desert Kingsnake



Checkered Whiptail Lizard



Mule Deer



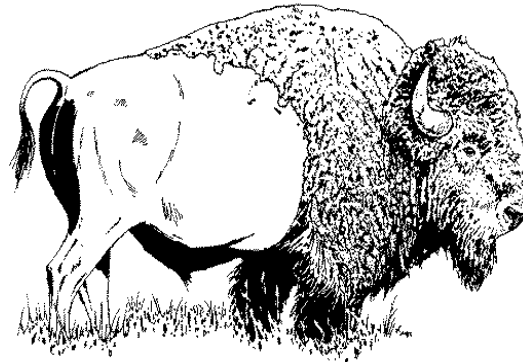
Pronghorn



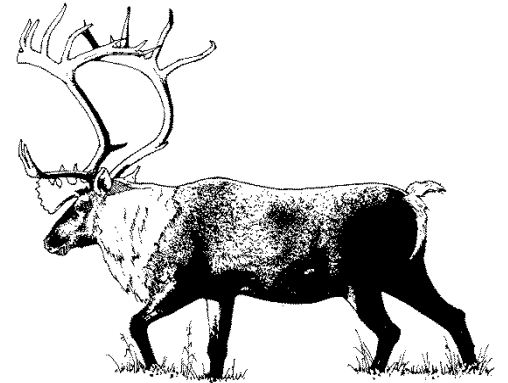
Grey Fox



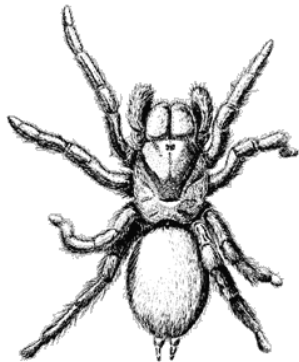
Bobcat



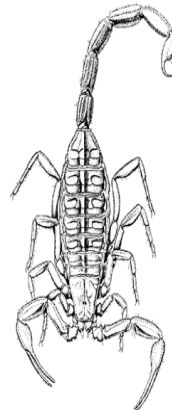
Bison



Elk



Desert Tarantula



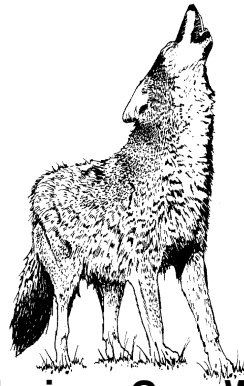
Bark Scorpion



Couch's Spadefoot



Black Bear



Mexican Gray Wolf



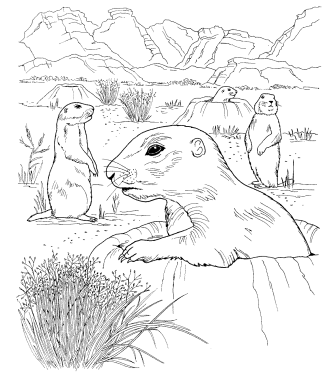
Mountain Lion



Ringtailed Cat



Javelina



Black-tailed Prairie Dog



Black-tailed Jack Rabbit



Badger



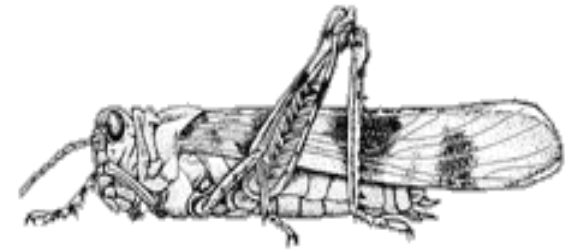
Mexican Free-tailed Bat



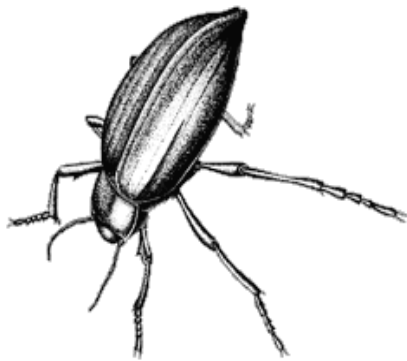
Centipede



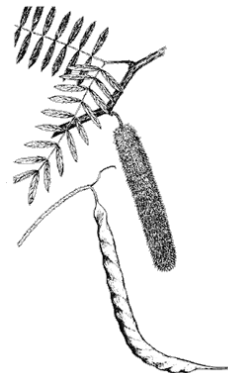
Millipede



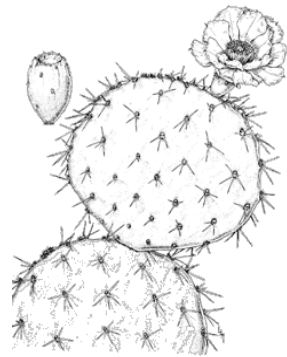
Banded Wing Grasshopper



Pinacate Beetle



Honey Mesquite



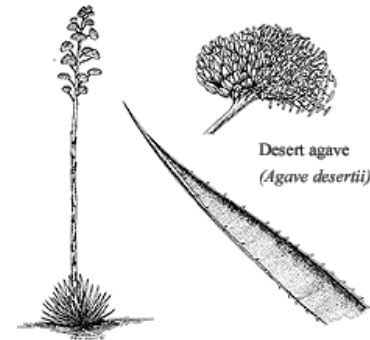
Engelmann Prickly Pear



Soaptree Yucca



Spanish Bayonet



Desert Agave

Grey Fox

Urocyon cinereoargenteus
Mammal

Size: 3-4 ft. long; 7-15 lbs.

Coloring: Cinnamon colored sides and neck, with a silvery-gray back, a black ridge down its back with a black tip on its tail

Diet: Rodents, insects, small vertebrates, fruits, and vegetables

Did you know that a Grey Fox:

- is the master of the ambush?
- is a very intelligent animal?

Pronghorn

Antilocapra americana
Mammal

Size: 3 ft. tall, 5 ft. long; 90-130 lbs.

Coloring: Buff colored with two white bands across the throat, white under-parts, and a prominent white rump patch

Diet: Grasses and forbs

Did you know that the Pronghorn:

- sheds the hard, hairy sheath of its horns and retains its bony core?
- is the fastest mammal in North America?

Mule Deer

Odocoileus hemionus
Mammal

Size: 3 ft. tall, 5 ft. long; 100-400 lbs.

Coloring: Dark gray in winter, reddish-brown in summer with a large white rump patch which surrounds a small black tipped tail

Diet: Woody shrubs and trees, also grasses

Did you know that Mule Deer:

- are named for its large ears?
- only males have antlers?

Elk

Cervus elaphus
Mammal

Size: 8 ft long, 5 ft antlers; 400-1000 lbs.

Coloring: Reddish-brown with dark hair on its neck with a pale yellow rump patch surrounding a small white tail

Diet: Grasses

Did you know that the Elk:

- only lose antlers in midwinter, and begin regrowth within a month?
- associate in herds of 25 or more?

Bison

Bos bison
Mammal

Size: 6 ft. at shoulder; 950-2650 lbs.

Coloring: Dark brown with an even dark thick hair that surrounds its head and face

Lifespan: 18-25 years

Diet: Grasses

Did you know that the Bison:

- can run up to 35 miles per hour?
- have more hair on their head because they face into the cold and wind?

Bobcat

Lynx rufus
Mammal

Size: 3 ft. long; 15-35 lbs.

Coloring: Reddish-tan coat scattered with dark spots and stripes, a tipped-tail with a white underside

Diet: Rabbits, rodents, insects, birds, and occasionally a young deer or pronghorn

Did you know that the Bobcats:

- have spots on ears for kittens to follow?
- have a naturally "bobbed" tail?

Spadefoot

Scaphiopus couchi
Amphibian

Size: 3 inches

Coloring: Greenish, yellowish, olive frog with irregular blotches of black, brown, or dark green. White belly without markings.

Lifespan: 6-12 years

Diet: Insects

Did you know that the Spadefoot:

- has a call that sounds like a sheep?
- has eggs that hatch in one day?

Bark Scorpion

Centruroides exilicauda
Arthropod

Size: 2-3 inches

Coloring: Tannish brown with darkly marked ridges

Lifespan: 2-5 years

Diet: Insects and other scorpions

Did you know that Scorpions:

- sting with a powerful venom?
- carry their babies on their back?
- are nocturnal?

Desert Tarantula

Aphonopelma chalcodes
Arthropod

Size: 3 inches

Coloring: Copper color with a reddish abdomen and black legs

Lifespan: 25 years (female), 10-12 (male)

Diet: Insects, small lizards, and rodents

Did you know that Tarantulas:

- have large fangs that inject venom into their prey?
- are preyed upon by skunks and coyotes?

Harris' Hawk

Parabuteo unicinctus
Bird

Size: 21 inches, 51 inch wingspan

Coloring: Dark brown with chestnut shoulder patches, a long black tail with white at its base and tip

Diet: Rodents, rabbits, and birds

Did you know that Harris' Hawks:

- hunt in groups?
- have a loud, rasping call?

American Kestrel

Falco sparverius
Bird

Size: 10 inches long, 23 inch wingspan

Coloring: Mostly brown, with rust brown on back and tail, black and white head

Lifespan: 11 years

Diet: Insects, mice, lizards, and snakes

Did you know that the Kestrel:

- hovers in midair?
- male offers food to female during courtship?

Gambel's Quail

Callipepla gambelii
Bird

Size: 10-12 inches long

Coloring: Male-brown with various bars and markings, black patch on breast, reddish sides, and large plume on its head. (Female differs slightly)

Diet: Seed, fruit, insects, and mesquite buds

Did you know that the Gambel's Quail:

- has a total of 10 call types?
- can survive extremely cold temperatures?

Turkey Vulture

Cathartes aura
Bird

Size: 26-32 inches long; 72 inch wingspan

Coloring: Small naked red head with two-toned blackish wings and paler flight feathers

Diet: Carrion, garbage, and offal

Did you know that the Turkey Vulture:

- utters faint hisses, grunts, and barks when alarmed?
- will vomit as an act of self-defense?

Golden Eagle

Aquila chrysaetos
Bird

Size: 30-40 inches long, 84 inch wingspan

Coloring: Dark with slight lightening at base of tail with a wash of gold on the hind-neck, legs and talons are golden

Lifespan: 18-40 years

Diet: Rabbits, birds, grouse, and waterfowl

Did you know that the Golden Eagle:

- has a yelping bark (seldom heard)?
- uses same nest for many years?

Burrowing Owl

Athene cunicularia
Bird

Size: 8-11 inches long

Coloring: Brown, spotted, and barred with two white eyebrow marks above two yellow eyes

Diet: Large insects, rodents, and birds

Did you know that the Burrowing Owl:

- when disturbed sends off an alarm that imitates a rattlesnake?
- returns to the same nest year after year?

Greater Roadrunner

Geococcyx californianus
Bird

Size: 20-24 inches long

Coloring: Dark with white markings, stream-like plumage, off-white lower-down with black stripes, with blue legs and beak

Diet: Insects, lizards, rodents, and fruit

Did you know that the roadrunner:

- can run up to 15 miles per hour?
- is a member of the cuckoo family?

Common Raven

Corvus cryptoleucus
Bird

Size: 19-21 inches long

Coloring: Glossy black feathers with white bases if ruffled on neck and breast, with black feet, legs and bill

Diet: Omnivorous, carrion, insects, plants

Did you know that the raven:

- can mimic human speech?
- likes shiny things and often steals them?

Cactus Wren

Campylorhynchus brunneicapillus
Bird

Size: 7-9 inches long

Coloring: Brownish with heavy spotting that gathers into a cluster on upper breast, white stripe over eye and white spots on outer tail, dark beak, light legs and feet

Lifespan: 7 years

Diet: Insects, fruit pulp, and seeds

Did you know that the Cactus Wren:

- has a call that sounds like "chug, chug"?

Western Diamondback Rattlesnake

Crotalus atrox
Reptile

Size: 30-84 inches long

Coloring: Gray, brown, pink, or yellowish with light brown to black blotches on its back

Lifespan: 20-25 years

Diet: Rodents, rabbits, lizards, and birds

Did you know that this rattlesnake:

- is called "coon tail" for the rings on its tail?
- causes the most number of serious

Western Coachwhip

Masticophis flagellum
Reptile

Size: 3-8 ft. long

Coloring: Tan, gray, pink, black, and even a reddish-brown color

Diet: Rodents, birds, eggs, lizards, insects, and carrion

Did you know that the Coachwhip:

- has been clocked moving at 3.6 MPH?
- seizes and swallows prey without killing it?

Desert Tortoise

Gopherus agassizii
Reptile

Size: Up to 14 inches

Coloring: Brown to gray with a yellowish underside

Lifespan: 35-40 years

Diet: Grasses and cacti fruit

Did you know that the Desert Tortoise:

- can live without water?
- is protected in all areas?

Horned Lizard

Phrynosoma spp.
Reptile

Size: 2-5 inches

Coloring: Brown, flat, toad-like body with thorn-like projections at rear of head

Diet: Insects (especially ants)

Did you know that the Horned Toad:

- squirts blood from its eyes as defense?
- uses its large, flat body as a solar collecting panel?

Gopher Snake

Pituophis melanoleucus
Reptile

Size: 4-9 ft. long

Coloring: 33–66 light to dark brown or reddish blotches on a yellow, tan, or cream colored background, dark stripe runs from in front of the eye to angle of jaw

Lifespan: 20-25 years

Diet: Rodents, rabbits, birds, and eggs

Did you know that the Gopher Snake:

- is sometimes mistaken for a rattlesnake?

Gila Monster

Heloderma suspectum
Reptile

Size: 2 ft. long

Coloring: Bright pink/orange and black, usually in reticulated pattern and beaded look of dorsal scales

Lifespan: 20-30 years

Diet: Rodents, rabbits, lizards, and eggs

Did you know that the Gila Monster:

- is one of only two venomous lizards in the world?

Checkered Whiptail Lizard

Cnemidophorus spp.
Reptile

Size: 2-6 inches

Coloring: Tan, olive, or brown with lighter stripes or spots of yellow or white

Diet: Variety of invertebrates and insects

Did you know that Whiptails:

- are most active in the morning?
- reproduce (in 30% of subspecies) without a male lizard?

Desert Kingsnake

Lampropeltis getulas
Reptile

Size: 3-6 ft.

Coloring: Dark brown or black snake with narrower bands of yellow, white, or cream around body; smooth and glossy

Diet: Lizards, birds, frogs, eggs, and snakes

Did you know that the Kingsnake:

- includes the rattlesnake as part of its diet?
- seldom strikes when threatened but discharges a musk?

Collared Lizard

Crotaphytus collaris
Reptile

Size: 8-12 inches

Coloring: Tan, bright green, olive, brown, bluish, or yellowish body with many light spots and two black collars around neck

Diet: Grasshoppers, insects, and lizards

Did you know that the Collared Lizard:

- is diurnal (hunts during the day)?
- runs on two back legs with front two tucked against chest?

Mountain Lion

Puma concolor
Mammal

Size: 6-7 ft. long; 100-200 lbs.

Coloring: Tawny coat is a monotone shade with lighter areas under its belly and inside legs, sometimes has a black tipped tail

Lifespan: 15 years

Diet: Deer and other hoofed animals

Did you know that Mountain Lions:

- roam a wide area up to 200 sq. miles?

Mexican Grey Wolf

Canis lupus
Mammal

Size: 5-6 ft. long; 50-175 lbs.

Coloring: Gray with scattered black and dark brown hair, dark tips on ears and areas on face

Lifespan: 10-15 years

Diet: Deer, elk, and other large prey

Did you know that the Grey Wolf:

- is an Endangered Species?
- has long legs for running distances?

Black Bear

Ursus americanus
Mammal

Size: 5-6 ft. long; 200-500 lbs.

Coloring: Comes in many colors from pure white to totally black. In West usually in brown, cinnamon, or tan

Lifespan: Up to 27 years

Diet: Fruit, nuts, insects, meat, and garbage

Did you know that the Black Bear:

- can sprint more than 25 miles per hour?
- stores fat for winter hibernation?

Black-tailed Prairie Dog

Cynomys indovicianus
Mammal

Size: 1-2 ft. long

Coloring: Brownish, cinnamon color with a black tipped tail

Lifespan: 8 years

Diet: Grasses, leaves, roots, and seeds

Did you know that the Prairie Dog:

- live together in towns?
- live in burrows?

Javelina

Pecari tajacu
Mammal

Size: 3-4 ft. long; 40-50 lbs.

Coloring: Black and gray bristles blend to form a "salt and pepper" color with a lighter band of hair around its neck

Lifespan: 15 years

Diet: Mesquite beans, fruits, and cactus

Did you know that the Javelina:

- can go days without water?
- is not a pig but looks like one?

Ringtailed Cat

Bassariscus astutus
Mammal

Size: 1-2 ft. long; 1-2 lbs.

Coloring: Grayish-brown with a fluffy black and white ringed tail, with white ringed large black eyes

Diet: Rodents, fruit, birds, reptiles, and insects

Did you know that the Ringtailed Cat:

- is nocturnal?
- uses its long tail for balance?

Mexican Free-tailed Bat

Tadarida brasiliensis
Mammal

Size: 4 inches

Coloring: Dark brownish black with a lighter underside

Diet: Moths and other insects

Did you know that the bat:

- migrates to Mexico every winter?
- travels up to 200 miles a night?

Badger

Taxidea taxus
Mammal

Size: 2-3 ft. long, 30-45 lbs.

Coloring: Dark "badges" offset white cheeks and a white stripe that extends from its nose, between ears, to the shoulder area

Diet: Large rodents, gophers, and reptiles

Did you know that the badger:

- has been recorded traveling together with coyotes?
- has loose versatile skin?

Black-tailed Jack Rabbit

Lepus californicus
Mammal

Size: 2 ft. long, up to 6 inches long (ears)

Coloring: Gray with black tips on its ears with a black stripe that runs along the top of the tail to the rump

Diet: Grasses and forbs

Did you know that the Jack Rabbit:

- uses its long ears to help cool its body?
- can run very fast?

Banded-wing Grasshopper

Acridinae achurum
Insect

Size: 1-2 inches long

Coloring: Hind wings can be red, orange, yellow with white bands on drab brown forewings

Diet: Plants and leaves

Did you know that the Grasshopper:

- uses its color to blend into its background?
- can leap over 20 times its body length?

Millipede

Orthoperus ornatus
Arthropod

Size: 4-5 inches long

Coloring: Dark golden brown

Diet: Decaying organic material

Did you know that the Millipede:

- spends most of its time underground?
- if threatened exudes foul tasting chemicals from its body?

Centipede

Scolopendra polumorpha
Arthropod

Size: 4-5 inches long

Coloring: Brown and tan

Diet: Insects, arthropods, lizards, and small rodents

Did you know that the Centipede:

- actually pinches, not "bites"?
- injects venom into prey?

Engelmann Prickly Pear

Opuntia engelmannii
Plant

Size: Mounds up to 5ft.tall, and 2-3 times wider

Coloring: Blooms on green pads are bright yellow, has a rich purplish-red fruit

Blooming Season: May near end of Spring

Did you know that the Prickly Pear:

- fruit is edible by animals and by humans?
- pads can get over a foot wide?

Honey Mesquite

Prosopis glandulosa
Plant

Size: 10-30 ft.

Coloring: Two pinnae with smooth or hairy bright green leaflets

Blooming Season: Spring and sometimes midsummer

Did you know that the Honey Mesquite:

- is used to make beautiful furniture?
- seeds are dispersed by trucks transporting cattle?

Pinacate Beetle

Eleodes spp.
Insect

Size: 1 inch in length

Coloring: Glossy black

Diet: Carrion, animal scat, plants, and wood

Did you know that the Beetle:

- uses antennae as receptors to detect food, locate egg laying sites, and assess temperature and humidity?
- Is part of largest group of insects on Earth?

Desert Agave

Agave desertii
Plant

Size: 12-20 ft tall, 1 ft. in diameter

Coloring: Leaves are light gray to bluish-gray with marginal teeth, the flowers are bright yellow

Blooming Season: Summertime

Did you know that the Desert Agave:

- forms in ring-shaped colonies?
- is extensively harvested by desert peoples?

Spanish Bayonet

Yucca filamentosa
Plant

Size: 8 ft. tall, 3-6 ft. in diameter

Coloring: Bluish-green rosette with creamy white flowers

Blooming Season: Beginning of summer

Did you know that the Spanish Bayonet:

- are pollinated by a moth?
- have some flowers tinged with purple?

Soaptree Yucca

Yucca elata
Plant

Size: 23 ft tall

Coloring: Flowers are a creamy white on a large green stalk with green leaves

Blooming Season: May and June

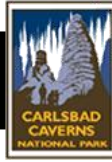
Did you know that the Soaptree Yucca:

- leaves are used as a basketry fiber?
- leaves can grow up to 2 feet long?

We're All Connected

Scenario cards

<p>A family has chosen to make camp on the edge of a pristine meadow. They stay for a week and when they leave you see a rock fire ring, several logs that had been used for benches, and a well worn area in and around the campsite.</p> <p>Questions:</p> <ol style="list-style-type: none"> 1. How will this scene attract more campers to the area? 2. How might increased usage by campers affect the meadow's community of life? 	<p>Your group has been hiking all day in the desert. You camp near a small desert water hole. Some of the campers decide a refreshing dip in the pond is just what they need.</p> <p>Questions:</p> <ol style="list-style-type: none"> 1. How might the campers affect the animals that use this location at night to get their water? 2. What should you do and what, if anything, should you say to the other campers?
<p>A group of campers go out for an afternoon hike. They spot an area filled with beautiful flowers. Later that day they all return home with a handful of flowers as a souvenir.</p> <p>Questions:</p> <ol style="list-style-type: none"> 1. Why should the flowers be left in their natural setting? 2. How else might campers be able to capture the beauty of nature without leaving an impact on the community? 	<p>It's time for supper. It is your job to collect the firewood. You pick up the axe and head out. A few yards down the trail you find a tree and begin to hack away. Finally you have a few pieces. You also decide to peel away some bark in order to get the fire started.</p> <p>Questions:</p> <ol style="list-style-type: none"> 1. Might these actions affect the trees and the environment? 2. What alternatives are there to cooking with fire?



Are You Ready?

What do you need to consider when planning a trip to the wilderness?

Summary: Students will participate in an activity designed to help them gain an understanding of the importance of planning ahead in order to ensure safety and minimal impact on the environment.

Duration: 1 class period

Setting: Classroom

Vocabulary: environment, conservation, preservation

Standards/Benchmarks Addressed: SC1-E1, SC2-E1, SC3-E1, SC4-E1, SC4-E5, SC5-E2, SC6-E1, SC6-E2, SC6-E3, SC6-E4, SC6-E5, SC11-E2, SC11-E5, SC11-E6, SC11-E8, SC16-E1, SC16-E2

Objectives

Students will:

- explain the concept of conservation.
- explain the concept of preservation.
- explain how education and planning help reduce impact on the environment.

Background

Those who are concerned with protecting the environment often use the words conservation and preservation. Although these two terms are often confused and are used to mean the same thing, differences exist.

Conservation is the sustainable use and management of natural resources including wildlife, water, air, and earth deposits. Natural resources may be renewable or non-renewable. The conservation of renewable resources like trees involves ensuring that they are not consumed faster than they can be replaced. The conservation of non-renewable resources like fossil fuels involves ensuring that sufficient quantities are maintained for future generations to utilize. Conservation of natural resources usually focuses on the needs and interests of human beings, for example the biological, economic, cultural, and recreational values such resources have. Conservationists accept that development is necessary for a better future, but only when the changes take place in ways that are not wasteful.

Preservation, in contrast to conservation, attempts to maintain in their present condition areas of the Earth that are so far untouched by humans. This is due to the concern that mankind is encroaching onto the environment at such a rate that many untamed landscapes are being given over to farming, industry, housing, tourism, and other human developments, and that we are losing too much of what is “natural.” The mindset of preservationists can range from protection of nature for purely human-centered reasons to preservation regardless of their usefulness to humans. The latter follows the belief that every living thing has a right to exist and should be preserved.

Regardless of where you stand on your beliefs towards preservation, we cannot deny that plants, insects, animals, and humans owe their existence to one another. When one member of the web of life has been altered or eliminated, other living things are invariably affected.

People are an integral part of the Earth's ecosystem and the health of ecosystems is intertwined with the viability of human communities. Like all living beings, people require the use of resources. From the air we breathe to our food, water, shelter, clothing, arts, and communication networks, we consume resources to live. Just try to imagine something in your home that is not grown or mined. We tend to forget the fact that natural resources usually support a country's economy. Our goal in managing the ecosystem should be the wise and reasonably paced use of our resources to assure their availability far into the future. Individuals can take actions to make a difference.

Materials

Pictures of the desert

Travel cards

Low Impact Techniques handout

Survival Backpack handout

Prep

Teacher will bring a backpack packed for an imaginary day hike of your choice.

Procedure

Warm up: Teacher will explain to the students that they will be going on an imaginary hike. Tell students that they will use the *Survival Backpack* handout to draw pictures of what they will need to take. Students may ask where they are going but explain that they will have to guess.

Allow students enough time to complete their drawings and then reveal to them the location of the imaginary hike. Show them destination pictures (pictures of a desert location or any location you have chosen). Explain the purpose of the trip (fishing, wildlife viewing, etc.). The teacher will then unpack his or her bag to show the equipment necessary for a successful hike.

Ask the students to "unpack their packs" and consider the following questions.

- How well do the contents of your pack prepare you for your trip?
- How well do the contents of your pack ensure your safety? (proper clothes, maps, compass, small flashlight, water filter, firstaid kit, etc.)
- How well do the contents ensure minimal impact to natural resources?
- How well do the contents ensure your trip will meet your goal?

Ask the group to consider these questions.

- How would the contents of your pack change with different destinations?
- What other information would you need in order to pack properly for a trip?
- What is the value of knowing this information *before* packing?

Activity: Review *Low Impact Techniques*.

1. Pass out event and solution cards. Each student will get one card. The object of the game is to match the event with the solution.

Key for game: 1 & 11, 2 & 9, 3 & 13, 4 & 15, 5 & 12, 6 & 16, 7 & 14, 8 & 10

2. Once the students have paired up, each pair will plan a way to teach the plan ahead concept.
3. Have each pair take turns teaching the concept to the group.

Wrap Up: As a group:

- Discuss why trip planning is so important (ensures safety, allows the accomplishment of your trip goals, allows minimal impact on natural resources).
- What elements should be considered when trip planning (identify goals, skills and ability, gain knowledge of the area you plan to visit, choose proper equipment and clothing)?
- Discuss the concepts of conservation and preservation and how they affect us.

Assessment

Students will work in groups to research topics related to the wilderness, conservation, or preservation. Students will present their findings to the class.

Are You Ready?

Conservation/Preservation Rubric	<i>Self Evaluation</i>	Teacher Evaluation	Comments
Written:		/16	
Identify at least three reasons why trip planning is important.			
Describe key elements of successful planning and preparation.			
Explain the concept of conservation or preservation.			
Explain the relevance of conservation or preservation as it applies to your area of research.			
Presentation:		/4	
Presentation quality, organization, information, and appeal			
Teamwork:		/4	
Are the efforts of each team member clearly demonstrated?			
Responsibility:		/4	
Turned in on due date and presented in class with visual aids.			

4 - no mistakes 3 - few mistakes 2 - many mistakes 1 - incomplete (however is present) 0 - not evident or not included

Percentages: Visual _____ Written _____ Presentation _____ Responsibility _____ Teamwork _____ Overall _____

Are You Ready? Travel Cards

<p>Event Card 1 You and your family are walking along a trail when you suddenly come up to a fenced off area and a sign that reads, "Private Property." Now what?</p>	<p>Solution Card 13 The planner of this hike had come to this area two weeks ago and found several alternative sites. Therefore, after hiking another 15 minutes you find the perfect spot.</p>
<p>Event Card 2 You haven't brought a stove, and the area you came to visit has been heavily used. To make matters worse there's a fire ban and everyone's hungry.</p>	<p>Solution Card 9 Because this was only an overnight camping trip, someone brought prepared food along. As night falls everyone gathers around for sandwiches and fruit and to watch for falling stars.</p>
<p>Event Card 3 It is getting late and you haven't reached your destination yet. You are tempted to set up camp here on the trail, what do you do?</p>	<p>Solution Card 15 After another hour of an uncomfortably dry hike, you run across another hiker who pulls out a water filter designed to remove bacteria from open water sources. You take a break by a small pond and filter enough water to finish your hike. Make a note to purchase a water filter or purification tablets before your next hike.</p>
<p>Event Card 4 You thought everyone in the group brought plenty of water, but it has been a long hot trip. With a fire ban in effect and a low supply of water, what do you do?</p>	<p>Solution Card 11 The planner of this hike had reviewed a map several weeks ago and realized he needed to contact the owner of the land. Therefore, he now has a signed permission statement to cross the private property.</p>

Are You Ready?

Travel Cards

<p>Event Card 5 Your new hiking boots have rubbed a blister on your heel. Your backpack is feeling extremely heavy and you're not sure if you can make it to the campsite.</p>	<p>Solution Card 16 While planning your trip you read safety tips and found out that lightning is attracted to the highest point and that water and metal are conductors. You hike to the lowest spot and crouch down. Remove your metal frame, stay away from water and tall trees, and insulate yourself from the ground by sitting on your pack.</p>
<p>Event Card 6 After a beautiful day the clouds begin to roll in. You can see lots of lightning. You estimate you have about ten minutes until the storm reaches you.</p>	<p>Solution Card 12 Encourage everyone to check "hot spots" while you take a break. Change your socks often and keep your feet clean and dry. Remember to carry an adhesive felt-like material that acts like a second skin to help prevent rubbing.</p>
<p>Event Card 7 You felt energized when you left this morning but now your backpack feels like it's loaded with stones. You're so tired you feel like stopping right here.</p>	<p>Solution Card 10 When you were planning the hike you figured that people hike an average of 2 miles an hour on flat surface. You realized that you should add an extra hour for the steep terrain. Encourage everyone to take it steady and slow. You have plenty of time to reach camp.</p>
<p>Event Card 8 Your hike is two miles long and is a very steep trail. Your campsite is still a long ways off, but everyone is having to walk very slowly.</p>	<p>Solution Card 14 Your heavy backpack has made it impossible to reach your destination. Plus, you've had a miserable day. Next time, keep in mind that your pack should be no more than a fourth of your body weight. Take only items necessary and divide them among several packs.</p>

Low Impact Techniques

1. **Plan ahead and prepare** – Proper planning and preparation increases the opportunity for a positive learning experience and helps ensure a safe trip. Poor planning can lead to a miserable experience or, worst of all, a rescue event.

Tips in planning ahead:

- Write down your expectations of the trip.
- Assess the skills and abilities of the members of your group.
- Get information about the area you plan to visit (get maps, etc.)
- Stay away from areas susceptible to flash flooding.
- Carry plenty of drinking water.
- Check weather conditions.
- Talk with the local land managers regarding any regulations, permits, etc.
- Choose appropriate equipment and clothing.
- Anticipate food usage (and the waste).
- (Meal planning is essential. Planning for lightweight snacks and one-pot meals can reduce the dependency on campfires, reduce trash, and reduce pack weight.)

Outdoor Essentials:

- Extra clothes
 - Extra food
 - Camera
 - Pocketknife
 - Matches and fire starters
 - Sun and insect protection
 - Watch
 - Water bottles
 - Maps and compass
 - First-aid kit
 - Stove
 - Rain gear
 - Trowel for digging a cathole
 - Strainer for removing food particles from dishwater
 - Axes and saws are not needed. A Low Impact fire is built by collecting downed wood.
2. **Hike and camp on durable surfaces** – Hikers should concentrate activities in heavily used areas. The goal is to enjoy the experience while minimizing the damage to the land. Damage can occur when hikers trample surface vegetation or communities of organisms beyond recovery. Choose one well-designed route. In pristine areas it is important to spread the use and impact. Two primary factors influence how off-trail travel affects the land:

durability of surfaces and vegetation, and frequency of travel. Surface durability refers to the ability of surfaces to withstand wear. Frequency increases the likelihood of an area being trampled. Durability of the surface is an important consideration. Rocks, sand, and gravel are highly durable. Ice and snow make good choices for travel as long as there is sufficient depth and firmness to prevent vegetation damage. Making careful decisions about traveling across vegetation is vital to prevent damage to fragile vegetation. A general rule is to spread out to avoid creating a path that would encourage others to follow. In desert environments, cryptobiotic crusts that consist of tiny communities of organisms are extremely vulnerable to foot traffic. One footstep can destroy cryptobiotic crust for decades. In this case it is best to follow in one another's footsteps, thereby affecting the smallest area possible. In the desert water is a scarce resource for all living things. Don't disturb the water in any way. Even the smallest water hole is a home to tiny desert animals. Selecting a campsite is the most important aspect of low-impact use. Avoid camping close to water and trails (a good rule of thumb is at least 200 feet away) in order to allow access routes for wildlife. The object is to confine impact to places that already show use and avoid enlarging the area of disturbance. In a remote area, spread out tents, avoid repetitive traffic routes, and move the camp each night.

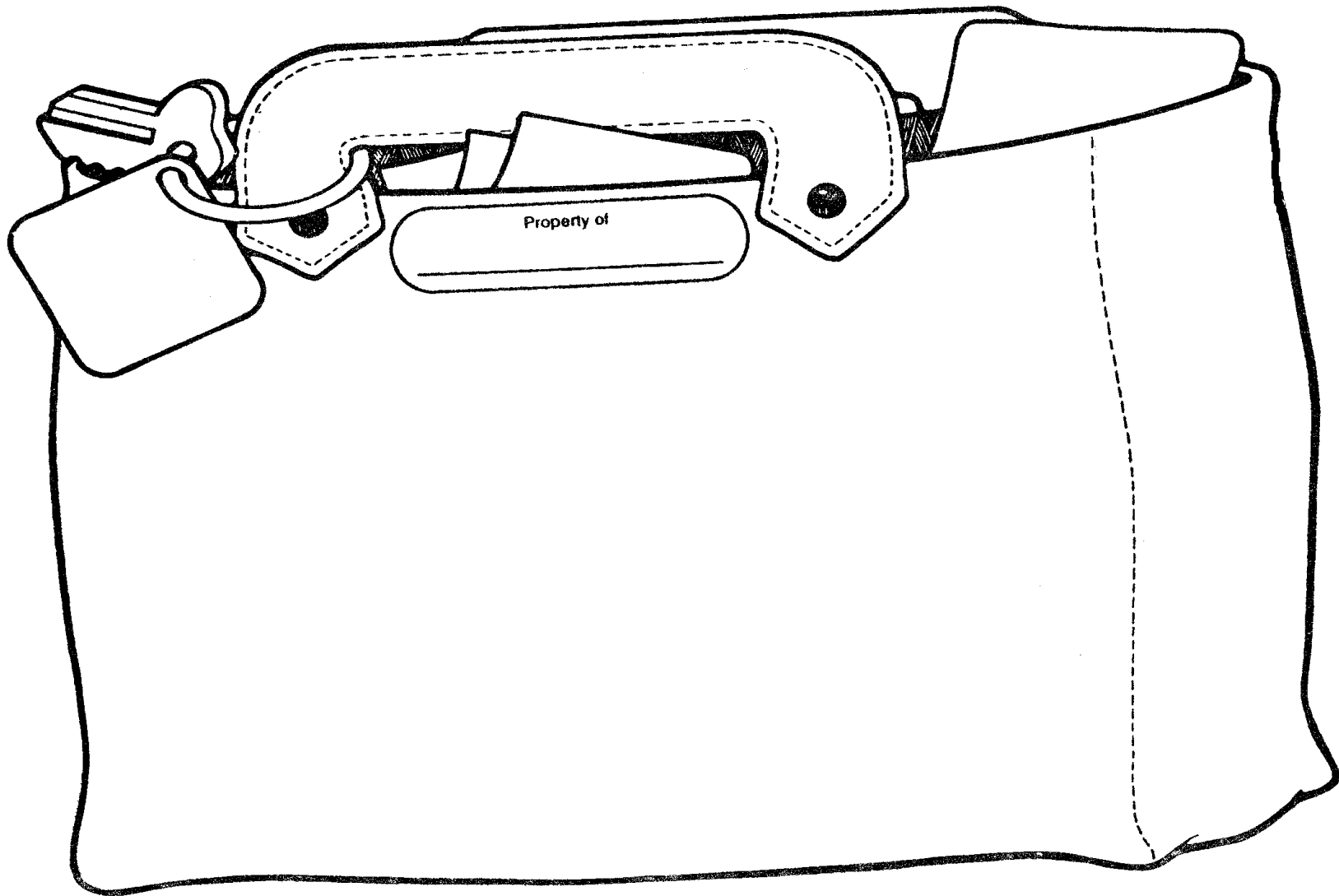
You should also *consider* wearing soft shoes and minimizing the activity around the kitchen. Before leaving, rake matted grassy areas with a stick and brush out footprints. In deserts beware of camping in areas susceptible to flash flooding and never camp on cryptobiotic soil or on islands of vegetation. In any situation never scrape away the organic litter in a site. The litter acts as a cushion, reduces erosion, and releases plant nutrients. The removal of rocks and gravel may destroy lichens and varnish that will not grow back within our lifetime.

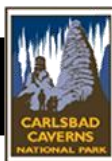
3. **Leave what you find** – Minimize site alterations by finding a good campsite not making one. Avoid damage to living things. Never cut, trample, or nail things into trees. Don't take on the mindset of "I'll just pick a few." Natural objects of interest should be left so others can experience the discovery. In many protected areas it is illegal to remove natural objects or cultural artifacts. Knowledgeable campers take a picture instead.
4. **Properly dispose of any waste (pack it in, pack it out)** – Trash and litter in the backcountry ranks high as a problem. This type of human impact can greatly detract from the naturalness of an area. It is possible to leave most potential trash at home if you take the time to repack food supplies. Never consider burning your trash. Areas are often closed to fires and some desert settings have a scarcity of firewood. Food scraps must be packed out. Under no circumstances should they be discarded or buried. Human food is not natural for wild animals. Their natural feeding cycles and habits become disrupted when fed by humans. Sanitation is another consideration. Dishwater should be strained and food particles sealed and packed out. Broadcast the water over a large area for quick evaporation and minimal impact. In most areas human waste can be buried if done correctly. However, places such as narrow river canyons or caves may require the waste to be packed out.
5. **Minimize the impact of campfires** – The most important consideration to be made when deciding to use a fire is the potential damage to the backcountry. Consider the fire danger, restrictions, and the supply of materials when deciding. If building a fire cannot be avoided choose an area where wood is abundant. It is always best to use an existing fire ring. Allow the wood to burn completely to ash and then put the fire out with water, not dirt. Scatter the remains over a large area away from camp. Keep the area looking as natural as possible. Pack out any litter.

6. **Be considerate of others** – Allow all visitors to enjoy their outdoor experience. Most people come to the outdoors to listen to nature therefore excessive noise and unleashed pets will take away from everyone's experience. In some areas pets may be prohibited. Consider keeping the noise level down by using headphones. Be courteous to other groups by yielding to both equestrians and hikers. Before passing others, politely announce your presence. When taking a break, make sure you are on a durable surface. Remember, it is up to us to keep our wilderness areas healthy and beautiful in order to ensure their use for future generations.
7. **Respect wildlife** – One of the most important aspects to keep in mind is that you are a visitor in their home. It is best to learn about wildlife through quiet observation. A good rule of thumb is that if your actions or presence causes wildlife to alter their normal habits then *YOU'RE TOO CLOSE*. Consider carrying binoculars, a spotting scope, or a telephoto lens to view wildlife. You may want to keep your group small to minimize your impact. Quick movement and loud noises are stressful to animals. Touching, feeding, or getting too close to an animal can put you or the animal in danger. If you find an animal in trouble, notify a ranger. Wildlife that obtain human food become nuisance animals that are often killed by cars or predators. Animals need access to their water source. Allow a buffer zone of at least 200 feet. Although swimming in lakes and streams may be fine, in desert areas where water is scarce, leave water holes unpolluted so animals may drink from them. Special care should be taken in bear country. Kitchens should be kept clean. Food must be hung at least 12 feet off the ground and 6 feet away from the trunks of trees. Consider using bear-proof containers in order to prevent destroyed packs as the bear searches for the source of food odors.

Name: _____

Directions: Draw the items necessary for your day hike experience.





Where Do We Camp?

What do you need to consider before you select a campsite in a desert environment?

Summary: This lesson is designed to help students understand how to select an appropriate campsite in a desert environment.

Duration: 1 class period

Setting: Classroom

Vocabulary: durable surface, cryptobiotic soils

Standards/Benchmarks Addressed: SC1-E1, SC2-E1, SC2-E2, SC2-E3, SC4-E1, SC4-E5, SC6-E1, SC6-E2, SC6-E3, SC6-E4, SC6-E5, SC6-E6, SC6-E7, SC11-E6, SC11-E10, SC12-E2, SC14-E2, SC14-E3, SC15-E2, SC16-E1, SC16-E2

Objectives

Students will:

- determine the best location for a campsite.
- apply Low Impact Techniques to campsite selection decisions.

Background

Those who are concerned with protecting the environment often use the words conservation and preservation. Although these two terms are often confused and are used to mean the same thing, differences exist.

Conservation is the sustainable use and management of natural resources including wildlife, water, air, and earth deposits. Natural resources may be renewable or non-renewable. The conservation of renewable resources like trees involves ensuring that they are not consumed faster than they can be replaced. The conservation of non-renewable resources like fossil fuels involves ensuring that sufficient quantities are maintained for future generations to utilize. Conservation of natural resources usually focuses on the needs and interests of human beings, for example the biological, economic, cultural, and recreational values such resources have. Conservationists accept that development is necessary for a better future, but only when the changes take place in ways that are not wasteful.

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People are an integral part of the Earth's ecosystem and the health of ecosystems is intertwined with the viability of human communities. Like all living beings, people require the use of resources. From the air we breathe to our food, water, shelter, clothing, arts, and communication networks, we consume resources to live. Just try to imagine something in your home that is not grown or mined. We tend to forget the fact that natural resources usually support a country's economy. Our goal in managing the ecosystem should be the wise and reasonably paced use of our resources to assure their availability far into the future. Individuals can take actions to make a difference.

Materials

A copy of the activity sheets
Adhesive colored dots

Procedure

Warm up: How many of you go camping? When you go camping do you pay close attention to the location of your campsite and its proximity to waterways, meadows, and trails? Do you notice what is on the ground around and under your tent?

Activity

1. Hand out the activity sheets. Divide the class into groups of 3-4. Explain that each group is part of a larger group on a camping trip to a pristine desert wilderness. Before beginning the activity the group must decide on the total number of people camping in the group. Keep in mind that this wilderness allows no more than 10 campers per group.
2. Distribute the tents (dots) to each group. Two people share a tent:
 - a. 10 campers = 5 tents.
3. Have the students place their tents (dots) on the activity sheet in appropriate camping places.
4. Review the background on Low Impact Techniques and discuss.
5. Discuss the locations of each groups' tent sites. Are they appropriate spots or not now that we have covered the Low Impact Techniques?
6. Now have the students rearrange the tent locations if the discussion has caused them to change their mind. Students should explain the reasons for any changes.
7. Summarize these key points for camping in a pristine area:
 - a. Choose a non-vegetated, highly resistant surface for tents and kitchens.
 - b. Choose durable routes of travel between parts of camp.
 - c. Avoid cryptobiotic soils.
 - d. Limit your stay to no more than two nights.

Wrap Up: Have students build a diorama of an appropriate desert campsite. They must include tents and kitchens set up in appropriate locations, a trail, a stream or river, and cryptobiotic soil. Students must also write the rationale behind their campsite location based on their diorama.

Assessment

Rubric for campsite and rationale

Where Do We Camp?

Desert Camp Diorama	Self Evaluation	Teacher Evaluation	Comments
Diorama criteria:		/24	
Depicts a desert habitat.			
Depicts tents and kitchens in appropriate locations.			
Includes a stream or river and cryptobiotic soil.			
Includes a visible trail.			
Uses a variety of natural materials to depict the desert environment.			
Includes a written rationale for the campsite location based on the diorama.			
Presentation		/8	
Presenter followed appropriate speaking rules (eye contact, voice, appeal, enthusiasm)			
Presentation quality, organization, appeal, and information			
Overall:		/4	
Has the student fulfilled all the parts of the task?			

4 no mistakes 3 few mistakes 2 many mistakes 1 incomplete (however is present) 0 not evident or not included

Percentages: Diorama _____ Presentation _____ Overall _____

Where Do We Camp?

